PDC2015

Frascati, Roma, Italy

Mitigation Techniques & Missions

IAA-PDC-15-P-81

Demo-mission for deflection of the asteroid 2001 JV1. Conceptions.

Tatiana Afanasieva,Yuri Kolyuka,
Yuri Lipnitskiy, ,
Sergey MeshcheryakovM

There is now only(99942) Apophis that has a real chance to collide with the Earth. This threat will be hanging for about the nearest 50 years. Then, for about 400 years, the asteroid cannot threaten the Earth but about 2500 it becomes a dangerous again. Other asteroids which are also classified as PHOs still don't get such attention. But it is not right. Let consider the asteroid 2001 JV1. Now it is classified as a PHO but it becomes really hazardous in about 700 years. Note, such interval is a real time scale of the problem. We should think not only on the objects which can collide with the Earth or will arise from nowhere right now but during a wider time interval. And the main attention should be paid to the technology of strong impacts on an asteroid because enough accurate statement on a danger can be done only several tens of years before a collision.

It is supposed that the most suitable method to deflect an asteroid is a using of nuclear explosion but a kinetic impactor can be used too. Note, the too strong impact can destroy an asteroid because small bodies of Solar System are usually glued of several chunks and fragmentation would lead to pollution of the Solar System and in a time it would lead to unpredictable situations for the Earth. So there are some limitations on the power of impact.

The first steps on the pathway that leads to the effective solution of the protection problem using a directional nuclear explosion is a development of appropriate schemes, methods and technologies. The experimental flight of a spacecraft with a nuclear charge to one of PHOs will close this phase. The goals of the flight will be a realistic estimation of our possibilities based on the modern or advanced level of space techniques. Besides this demonstration there are also the following goals:

- resolve technological and organization problems,
- investigate structures and the physical and mechanical properties of asteroid matter which are required for accurate deflection,
- check out the calculation methods for a high energy exertion for an asteroid.

There are presented the main conceptual states of a demo mission to the potentially hazardous asteroid 2001 JV1 and a detail scheme of such mission based on the rocket system Proton/Breeze-M/Navigator. There are also given the main

results of project-ballistic analysis of probable nearest terms for start and flight to the asteroid.

This work was done in frame of the project FP7-SPACE-2011-282703 NEOShield sponsored by European Commission.

There are used the orbital data for asteroid 2001 JV1 calculated by Jet Propulsion Laboratory (JPL).